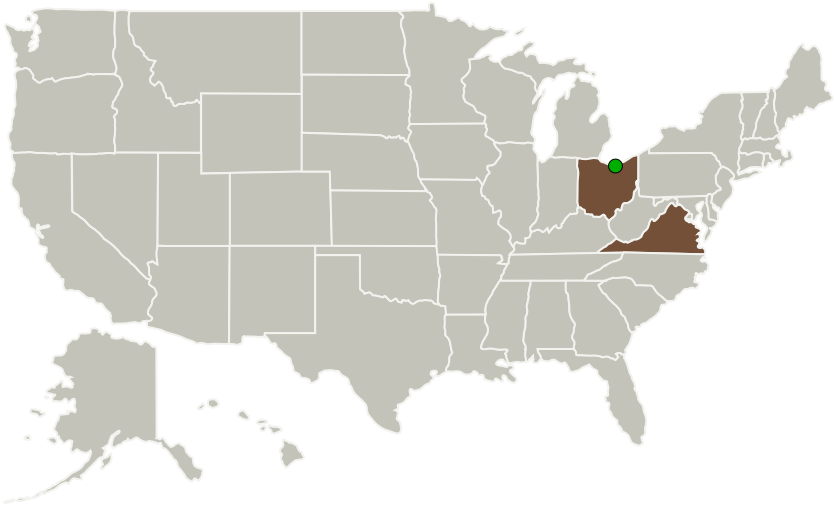
Desensitized Optimal Filtering and Sensor Fusion Tool Kit, Phase II

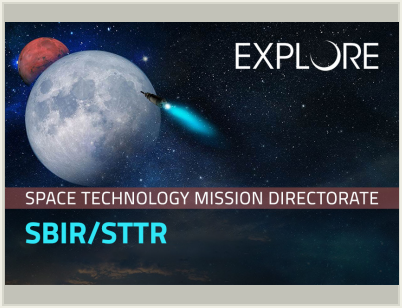
Completed Technology Project (2011 - 2013)

Project Introduction

Research on desensitized optimal filtering techniques and a navigation and sensor fusion tool kit using advanced filtering techniques is proposed. Research focuses on reducing the sensitivity of Kalman filters with respect to model parameter uncertainties using a robust trajectory optimization approach called Desensitized Optimal Control, developed by the proposing company. The proposed tool kit implements the research results as well as recent advances in robust and/or adaptive generalized Kalman and Sigma-Point filters for non-Gaussian problems with uncertain error statistics. The proposed research and development brings new filtering and sensor fusion techniques to NASA and industry in a convenient package which can be used as a stand-alone toolbox, either for ground support or for onboard applications. Its modular structure enables it to be readily integrated with other tools, and thus enhances the existing fleet of applications. The desensitized optimal filtering research and the feasibility study on components of the proposed tool kit will be carried out concurrently. The tool kit is a generic stand-alone application, and has a modularized structure which facilitates easy integration with existing tools. A suite of sensor models and noise distributions as well as Monte-Carlo analysis capability are included to enable statistical performance evaluations.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Analytical Mechanics Associates, Inc.	Lead Organization	Industry	Hampton, Virginia
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

June 2011: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138790)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Analytical Mechanics Associates, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Christopher D Karlgaard

Co-Investigator:

Christopher Karlgaard

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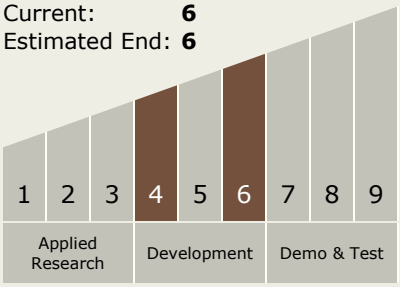
Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.2 Navigation Technologies
    - TX17.2.3 Navigation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System